# Science Fair At A Glance

**Date** Tuesday, November 16, 2010

**Place:** TBA

**Registration Deadline:** Wednesday, November 10, 2010

**Category Divisions:** Biological Sciences
Chemical / Physical Sciences
Earth / Space Sciences
Inventions / Engineering Sciences
Mathematical / Technological Sciences

**Project Space:** Each project will be given a table on which to place their display. All display materials must fit within a space that is 3 ft wide, 4 ft high, and 30 inches deep on the table top. Students that need electricity will need to bring a 25ft. extension cord and mark it on their registration form.

**Project Teams:** All science fair projects may be completed by 1 - 3 students. Each student may be entered in only one project.

# Science Fair Informational Resource Packet:

Background information that may be helpful as you design and conduct your experiment.

# I. Planning a Science Fair Project

This is information to help you with your science fair project. Through a science fair project, you can learn what it is like to think like a scientist, to investigate and experiment in an area of your interest, and to share your results. A science fair project must use the scientific method and not be just a demonstration or product comparison. We hope, with this information sheet, to prepare you for planning a good project using the scientific method.

## A. Doing a First Class Project:

A first class science fair project has four major features:

1. It contains an original, high quality experiment.
2. The results of your experiment are clearly and neatly displayed.
3. The display grabs the attention of the judges.
4. The project includes appropriate supporting scientific records that tell everything about your project. (These records may include a paper, notebook, journal, log book, lab report, or computerized data. These supporting records should be kept by the student and displayed at their table on fair day.)

## B. Making a Timetable:

Get out or make a calendar you can mark important information on. Cross off days planned for family, club activities and trips. Got your topic picked yet? Now work backwards from the day your project is due. Leave at least two weeks to write the final draft of your paper and to put together your display. Mark off a week for your first draft and a few days for your teacher to review it. Now you need a large block of time to collect your data (i.e. -Plants and seeds need weeks to sprout and to grow. Are you planning to chart some kind of activity for a month or more?) Then you will know when you need to start your experiment. Inexpensive digital cameras are excellent tools to document your plants or experimental progress.

## C. Presenting Your Project:

All of your hard work and your well done experiment will not be noticed if your project does not grab the attention of the judges and the public. Your project will be examined; your efforts appreciated and may be rewarded if your project is:

**1. Organized:** Arrange the presentation of your project so that the judges can easily examine and understand your experiment and your results. With one quick glance, a viewer should be able to easily find the four necessary parts of your display: the title, how you did your experiment, your data, and your conclusions. Remember, even though you are familiar with your topic and your work, when the judges first see it, they will have no idea what your project is about.

**2. The Title Is the Beginning:** Your title is what the judges might see first. But it should be so much more than just a beginning. A good title grabs the attention of the casual observer. It is short, yet it correctly and completely describes your entire project. A good title begs the people looking at your project to dig deeper. Do not disappoint them. Make sure that your title tells us what your project is about.

**3. Eye Catching and Attention Holding:** Home built equipment, neat and colorful headings, graphs and tables all draw attention to your project. The careful use of contrasting colors will help. For filling in charts and bar graphs, construction paper cut-outs look much better than coloring white paper. For line graphs, use different colored marking pens instead of pencils. One area often needing extra attention is the labeling of graphs, charts, diagrams and tables. Each item must have its own very descriptive title. All columns, axes and data must be clearly labeled and identified. A person should be able to understand each graph without having to read your paper or asking you to explain it. Also, bar graphs, line graphs and pie charts all have different purposes. Check with your math teacher to make sure you have the right type of graph to display your type of data.

**4. Correctly Presented, Well Constructed:** When your display is constructed, observe the size limitations (3ft wide, 4 ft high, 30 in deep), safety considerations and other rules for presentation of your project. Display boards are not required; however they can be purchased at a reasonable cost at businesses such as Hobby Lobby, and Michaels. You may also choose to build your own display or create a technological display.

## D. Dangerous Things NOT ALLOWED at Project or in Booth:

1. All hazardous substances or devices [for example, poisons, drugs, firearms, weapons, ammunition, reloading devices, and lasers]
2. Sharp items (for example, syringes, needles, pipettes, knives)
3. Flames or highly flammable materials
4. Any apparatus deemed unsafe by the Scientific Review Committee. If you have questions, please ask in advance.

## II. The Scientific Method:

Each collection of causes will produce a predictable event. Gaining knowledge about our world is simply understanding how and why a particular set of causes create a particular event. Over the years, scientists have developed a step-by-step method to investigate an event. It is called a "scientific method". The carefully studied event is called an "experiment". If care and honesty are used, the scientific method will help you study your experiment and to discover the correct cause and effect relationships. The following steps will lead you through the scientific method.

**1. Pick a Topic:** Before an event can be studied you must have some idea of what it is that you want to observe. Your topic might be "acid rain".

**2. Limit Your Topic:** You have very little time and few resources. You will be able to study only an extremely small collection of events. You must, therefore, limit your experiment to one or two specific events. "I will study the effect of nitrate bearing acid rain on a brick."

**3. Study, Observe and Gather:** Read about your limited topic. Observe related events. Gather existing information concerning your limited topic. Look for unexplained or unexpected events or results.

**4. Generalize:** Organize what you know about your topic. Make lists of known causes for specific events. Describe what generally happens when you observe related events.

**5. Theorize, Form a Question and Predict:** Write a sentence that predicts what will happen if you do your experiment. This statement is called a "theory" or “hypothesis”. Your theory must agree with observations already studied. From your theory put together the exact question that

you want to answer with your experiment. State what you think would happen if some of the causes of your event were changed. Causes that can change are called "variables." Some variables are turned on or off like a light switch, others change in size like the temperature setting of an oven.

**6. Experiment:** Design and conduct a series of experiments that will test your theory. You must design each experiment so you can observe the results if one and only one variable is changed. By changing just one variable, you can determine that particular variable's effect on your chosen event. To see the real effect, you may need to change the size of a single variable several times. Be sure to include one or more experiments when none of the variables are changed on purpose. This is called the "control experiment." The control is very important. It shows the normal results from your experiment if you don't try to change anything.

Be careful, you may be able to keep many variables from changing, but some you usually can't do anything about. Some variables you have control over are room temperature, time of day, how far you stretch a spring, relative humidity and how hungry your human or animal subject is. Some variables that you can't do anything about are atmospheric pressure, how bright the sunshine is, the mood skill, reflexes or previous dietary habits of yourself and/or subjects.

**7. Examine Your Results:** Did your experiments give you the expected results? Why or why not? You must be very honest! Reexamine your experiments. Was more than one variable changed at one time? Was your experiment done with the exact same steps each time? Are there other causes that you had not considered or observed? Were there errors in your observations? How large were the errors? If your physical skills were involved, how much better did you get at doing your job with each repeat? Remember that understanding errors and reporting that a suspected variable did not change the results can also be valuable information.

**8. Draw Conclusions:** What variables are important? Was your theory correct? Did you collect the proper data? Did you collect enough data? Does more work need to be done or is your experiment finished? If your theory didn't predict the correct results, yet all your errors are explained, you must return to steps C, D, and E